

Magneto-Luminescent Transducer

Abstract

5 An electronic system includes a three terminal device having a light emitting
portion and a magnetically sensitive portion. The magnetically sensitive portion is for
modulating light emission from the light emitting portion. The device is a spin valve
transistor having a light-emitting quantum well in its collector. The device can convert a
magnetic digital signal to both an electrical digital signal and an optical digital signal,
wherein either or both of these signals can be provided as a device output. The
magnetically sensitive portion of the device is formed of a pair of magnetically permeable
10 layers. When the layers are aligned electron current can pass through with sufficient
energy to reach a quantum well where they recombine, generating light. The device may
be used to read a magnetic storage medium, such as a disk drive. Or it can be used to
provide a display or a memory array composed of single device magnetic write, optical
read memory cells. Amplification can be provided to the transistor by adjusting the
15 collector base voltage to provide secondary electrons by impact ionization to provide
greater electron current and a correspondingly larger optical emission signal.